DOCUMENT RESUME

ED 138 082 FL 007 994

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TITLE Methods for Cataloguing, Storing, and Retrieving Large Volumes of Tape-Recorded Conversations. Working Papers in Sociolinguistics, No. 32.
INSTITUTION Southwest Educational Development Lab., Austin, Tex.
SPONS AGENCY Social Science Research Council, New York, N.Y. Committee on Sociolinguistics.
PUB DATE May 76
NOTE 26p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Cataloging; Connected Discourse; Discourse Analysis; *Information Retrieval; *Information Storage; *Language Research; Language Role; Language Usage; Medical Vocabulary; Patients (Persons); Physicians; *Research Methodology; *Sociolinguistics; *Tape Recordings

ABSTRACT

A major problem in doing linguistic research from tape-recorded material is finding specific tape content for later, detailed analysis of data. A project on use of language in medicine being carried out at the Cornell University Medical College has developed a method of cataloguing taped material that eliminates the need for transcriptions and permits rapid locating of a specific tape segment. The project studies taped conversations between doctors and patients to observe how speakers hear and understand each other in natural conversation and to use findings to teach medical students the uses and functions of language in medicine. Contents of tapes are organized into eight categories: address, or time of utterance; speaker; main conversational division; specific speech act; lexical content; miscellaneous linguistic and non-linguistic information; attitude displayed by the speaker, and the conceptual category - an abstract interpretation of the subject discussed. Categories are explained here with examples, and an appendix furnishes a transcript of recorded conversation and its corresponding cataloguing sample. (CHK)

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ED138082

WORKING PAPERS IN SOCIOLINGUISTICS

Number 32

May, 1976

Bruce Fraser

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Methods for Cataloguing, Storing, and Retrieving Large Volumes of Tape-Recorded Conversations

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Committee on Sociolinguistics
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Methods for Cataloguing, Storing, and Retrieving Large Volumes of Tape-Recorded Conversations[1]

One of the major problems encountered in doing linguistic research from tape recorded material is the following: how to find tape content for later, more detailed analysis of data? To deal with this problem in research on the use of language in the medical setting, we have devised a system which allows rapid access to any segment of recorded conversation. We present here a description of our methodology in the hope that it will not only serve as a guide for investigators engaged in similar research with recorded data but also to elicit comments and suggestions.

The method commonly employed in analyzing taped conversations is to first transcribe (typescript) the recording and then code the relevant material from transcriptions. Transcription of conversation is a laborious process requiring from six to eight hours of typing for each hour of tape and the search for specific data even from typed material remains difficult and time-consuming. Even so, because working directly from tapes is a laborious and tedious task, investigators tend to use typescripts, often without realizing that, no matter what mode of transcription has been used (phonetic or orthographic), they are no longer truly studying the utterances but only some coding of them. Since we thoroughly believe that the study of natural language must be based on sources as close as possible to the actual spoken word, we have developed a method of cataloguing tape recorded material which enables us

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[1]This work was supported by a grant from the Robert Wood Johnson Foundation.

to eliminate the need for transcriptions and to rapidly find a segment of interest on the original tape.

Our project on the use of language in medicine is being carried out at the Cornell University Medical College and involves the study of conversations between patients and doctors recorded in natural medical settings. Our long-term goal is to study verbal interaction in a medical setting, to draw conclusions on how speakers hear and understand each other in natural conversation, and to use this material to teach medical students the uses and functions of language as a tool in medicine. To this end we have collected data which represent over 900 hours of recorded material involving more than 2000 patient interviews and 800 patients. The largest segment represents recordings of patients in private practice, while the remainder involves hospital in-patients.[2]

Recording

In order to use this recorded material as a teaching tool, the project has developed recording methods which approximate studio quality stereophonic reproduction. Several recording systems are employed. The private practice method uses a separate Sennheiser wireless transmitting microphone for the doctor and patient. The two receivers are connected to a 1/4 inch stereo Revox A-77 tape recorder located in a separate room; each receiver records on a separate track. Doctor-patient interactions with hospitalized patients are also recorded stereophonically employing a Superscope portable stereophonic cassette recorder and separate high

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[2]Informed consent has been obtained for each recorded patient, and all tapes and individual patients have been assigned random numbers.

fidelity ECM-50 microphones attached to doctor and patient. Even when lesser quality microphones are used, stereophonic reproductions come very close to natural conversation.

Cataloguing of Tape Recorded Conversation

We have devised a system which consists of dividing the recorded content of a tape to be analyzed into eight different categories. Accordingly, we have chosen to organize the cataloguing into eight columns running down a page (see a sample of a catalogue page in Appendix A). The leftmost column (1), indicates the address of an utterance, followed by column (2) who is speaking, (3) the kind of main conversational division (narrative, explanation, etc.), (4) the specific speech act (question, request, etc.), (5) the lexical content, (6) miscellaneous linguistic and non-linguistic information, (7) the attitude or affect displayed by the speaker, and finally (8) the conceptual category (an abstract interpretation of the subject under discussion).

We will now examine each of these categories.

1. Address. This entry represents the time measured from the beginning of the tape in hours, minutes, seconds, at which an utterance takes place. Other category entries are referenced in terms of this address.

2. Speaker. Speakers are coded by letters starting with the beginning of the alphabet. The physician is always assigned letter A,

the patient B. Other participants in the interview are assigned letters alphabetically. The names of the doctor and patient are not catalogued.[3]

3. Main Conversational Division. Although each interview is composed of many utterances by both doctor and patient, these tend to group into reoccurring recognizable units. For our purposes, we have found nine different classifications sufficient to capture what is going on at any time. Each is therefore analyzed into successive contiguous main conversational divisions which function as:

a) Opening-closing: a social ritual such as a greeting and leave-taking.

b) Narrative: a sequence of utterances performed by a speaker usually reporting on symptoms, facts, or events.

c) Explanation: a sequence of utterances performed by one speaker whose intent is to ensure a hearer's understanding of a particular point or subject. It often involves argumentation or attempts at persuasion. The main difference between narratives and explanations is that the latter supply reasons for the arguments presented by the speaker, while the former mainly function as reporting devices. Both narratives and explanations (usually performed with statements) can be interrupted by the listeners or by the speaker himself by asking a question, seeking acknowledgment, etc. These interruptions are entered in column (4), speech acts. If the narrative or explanation is resumed immediately thereafter, it is still considered part of the same main conversational division. In the following example, an explanation is interrupted with a question:

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[3]Pertinent personal data on patient and doctor are filed separately and can be matched with each interview for statistical purposes.

Doctor: It is a sign to me, when you talk about pain, that that leg needs work, because restricting the use of a joint will give you real trouble. Do you understand what I mean? If you put a shoulder into a sling and just leave it there, it will freeze.

d) Interrogation: a series of questions on the same general subject. This main conversational division includes questions and answers, and may greatly vary in length, depending on whether it covers questions on the personal and medical history, or specific questions reported by the patient.

e) Elicitation: a series of short questions zeroing in on a specific subject. For example:

Doctor: When did your pain start?

Patient: Not too long ago.

Doctor: What do you mean? A month ago or a week ago?

Patient: I'd say it's closer to a week.

Doctor: Did you have it last Monday?

Patient: No, I don't think so.

Doctor: How about Tuesday?

Patient: Yeah, I guess that's when it started.

f) Bantering: casual joking or flirting behavior between patient and doctor on subjects peripheral or unrelated to the interview topic.

g) Idling: casual conversation between patient and doctor on a subject peripheral or unrelated to the actual interview topic. Both of these verbal activities usually serve to relieve tension during physical examinations or to establish rapport between patient and doctor.

h) Persuading: a sequence of utterances by which the speaker attempts to convince the hearer of his point of view. When this activity is

performed by the doctor, it usually is an attempt on his part to induce the patient to comply with his instructions related to therapeutic purposes.

i) Discussing: a sequence of utterances involving both the doctor and patient which may lack unity of content and in which, for instance, a variety of questions are raised or alternative decisions are presented and considered. For example:

Doctor:	It ought to be much better in 24 hours.
Patient:	The other ear, too?
Doctor:	Yes.
Patient:	I still have the bronchitis. What should I do about it?
Doctor:	When did it start?
Patient:	Last week.
Doctor:	Keep taking erythromycin and keep the bedroom humidified.

4. Speech Acts. Whereas main conversational divisions are units composed of more than one utterance, a speech act should be viewed as what the speaker does in a single utterance. The term refers to the point of an individual utterance wherein a speaker expresses his intent, say, to inform, apologize, promise, etc. (of course, the actual verb which names the act may not be used -- one may inform without actually saying "I'm informing you that..."). Although main conversational divisions are composed of series of speech acts, only certain speech acts have great relevance for our cataloguing. We have found the following to be adequate for our present needs:

informing
acknowledging
verifying
diagnosing

promising

correcting
warning
praising
reassuring
apologizing
criticizing
challenging
complaining
directing
requesting (for information, clarification, reassurance, permission, confirmation)
suggesting
permitting
hedging

5. Lexical Content. This column represents the speaker's actual spoken words entered in telegraphic form. It is a drastic condensation of the conversation, but allows one to follow the conversation. For example:

	Patient:
lot indigestion	Sometimes I've had a lot of, um,
	indigestion, and there'd be, you
burping	know, burping. Sometimes I'd feel
very full not eat	very full and not want to eat. Other
appetite not interfered	times I'd, my appetite wouldn't be
	interfered with at all, but I'd
lot bowel problems	have a lot of bowel problems.

6. Miscellaneous. This column represents linguistic and non-linguistic information. It is entered according to the following classification:

a) physical location: indicates where the interaction takes place, e.g., examining room, office, hospital, etc.

b) physical activity: indicates potential correlation between various speech activities (banter, idling) and parts of physical examination.

c) transition from location to location: indicates changes in location.

d) pronoun: indicates when reference is made to a third party.

e) personal/medical history: indicates the beginning and end of history-taking. When the patient's history is uneventful, no details are entered in the main conversational division or speech act column. But for research on routine history-taking, retrieval of the data is made possible from this column.

f) telephone interruptions: indicates beginning and end of phone conversation.

g) other interruptions: indicates beginning and end of interruption.

h) silences: indicates beginning and end of pauses if significantly longer than expected in normal conversation.

i) incomplete sentences: indicates when speaker does not complete sentence(s).

j) obvious miscommunication: indicates when misunderstandings occur.

k) shared information: indicates when speakers refer to subjects discussed on previous occasions in covert terms.

l) common assumptions: indicates when speakers discuss medical or other subjects in terms presupposing knowledge.

7. Attitude/Affect. This column covers the attitude or affect displayed by a speaker in a particular segment of the interview. It is obviously a subjective interpretation of the cataloguer's perception. It does not necessarily match what a speaker says, but captures what emotion is being conveyed. If no conspicuous attitude or affect is

perceived by the cataloguer, no entry is necessary in this category. When ambiguity occurs, more than one entry can be made under one address. The following list covers the expressions of attitude or affect which we have found useful as entries:

hostile/friendly	concerned/detached
fearful/confident	disappointed/relieved
compliant/resistant	apologetic/pretentious
embarrassed	minimizing/exaggerating
passive/aggressive	sarcastic
complaining	surprised
denying	

The choice among these possibilities is determined in many instances through the cataloguer's interpretation of the intonation, inflection, rate of speech, pauses, and so on. Inter-cataloguer reliability of these ratings runs much higher than we had originally anticipated.

8. Conceptual Category. This is the most abstract category, since it requires an interpretation by the cataloguer of the real subject under discussion in a particular segment of tape; for example, pain, family problems, illness, fear of death, fear of illness, and so on. No finite list of subjects is possible, since the topics involved are numerous and the real subject may never be explicitly mentioned. For example:

	Patient:
	I have--I was 32 years in my job,
	I never took time off for sickness
hernia	except one hernia, hernia operation,
self	and I feel pretty good, but sometimes
sickness	I'm a little bit tired, but I'm
	pretty busy, you know, I mean...

	Doctor:
	Mm-hm.
	Patient:
	Maybe this has something to do with
aging retirement self	it. But I'm retired--since two years
	ago--and I try to be as active as
	possible.

(See also Appendix A.)

At any point of the conversation, the content of one, two, or even all eight categories may be relevant and require cataloguing in the appropriate column. It is obvious that in attempting to reflect what one hears, some parts of the catalogue are less subjective (who is speaking) and some very subjective, such as affect or conceptual categories. Several things should be kept in mind, however: 1) the catalogue is merely a method of retrieving data from tape recordings; 2) it is a cataloguing and not a coding system, both in its original and computerized forms, and any part of the cataloguing can be changed, deleted, or enlarged; 3) in the most subjective categories, more than one entry is possible even if one appears to conflict with another; 4) like all skills, cataloguing improves in speed and accuracy.

Catalogued information can be stored in a computer in such a way that the file can be systematically searched, according to a set of criteria chosen from our categories, and matched with personal data. For example, the computer could compile a list of every tape number and tape address containing male patients over fifty describing pain associated with heart disease. The tape number and respective address (time) then lead the investigator directly to the segment of tape to be researched, an operation that is not automatic, but very rapid when using the laboratory's

tape search technology. While this allows semiautomation of the search, the same method can be employed using tape revolution counters when they have been calibrated against time. One could then examine, say, the content and form of the patient's report of symptoms (narrative), his attitude, his conceptions of the disease. One could also examine the doctor's responses to the patient, his attitude and his own conception of the disease. Obviously, not every utterance is catalogued.

The cataloguer thus determines which parts of the interview should be captured or left out. This decision is based on predetermined criteria regarding the relevance of form and content of what needs to be retrieved.

In summary, the project has developed a method that begins to solve the problem of storage and access to large volumes of tape-recorded content. While the contents of our categories were developed to meet the needs of our specific research area, we feel that our system can be adapted to the particular needs of other researchers engaged in similar work whose efforts have been hampered by the lack of an efficient system of search and retrieval of recorded data.

APPENDIX A

Transcript of Recorded Conversation Corresponding Cataloguing Sample

B: I have really no complaints, but I'm at an age where you need once in a while a check-up.

A: How old are you?

B: Uh, I will be 68 in May.

A: Mm-hm.

B: I have, I was 32 years in my job with X, but I never took time off for sickness, except one hernia, hernia operation. And--I feel pretty good--but sometimes I'm a little bit tired, but I'm pretty busy, you know, maybe this has--

A: Mm-hm.

B: Something to do with it. I, I'm retired since two years, and I try to be as active as possible--

A: What do you do?

B: I'm, on the staff, with the Q University for uh, recording operations, we built up some facilities. And then I did some teaching at the V Music School, and now I do it at, uh, R University.

A: Mm-hm.

B: And--the rest of my time, I spend in the darkroom, uh, 'cause I was very much involved with photography.

A: Mm-hm.

B: And--the only complaints I have--my--I fil-, I filled everything out; I don't have any really, except if it's very cold and I have no muffler on, then I--feel uncomfortable around the chest. Not, not that I have to stop, but it's just not very comfortable--

A: You mean when you walk along the street you feel it?

B: Yes. Yeh.

A: If the wind is blowing on you?

B: If, if it's very cold and I'm not warm enough.

A: Mm-hm. How long has that been?

B: A year, two years, or so.

A: Mm-hm. Is it worse this winter than it was last winter?

B: No, much less.

A: Mm-hm. Does it happen <u>any</u> other time?

B: Mm-no--maybe if I walk, too fast, uphill, which I, I have no reason to do, really.

B: Mm-hm. And--is that also a year or two?

B: Yeah, I guess so.

A: (telephone interruption) 'Scuse me. //Yes. Right. Well, ma'am, tell me about yourself. Heh, heh. What do you have there? Not ten to thirty you don't--what color is it? Because that's not a dosage that's used, thirty isn't used. Two. I-if they're blue, they're ten; if they're white, they're two. Ah. Mm-hm. Right. Alrightie; well, codeine is for milder pain, Percodan is for more severe pain, and Valium is so you'll be relaxed. Yeah, helps cope with muscle spasm. Mm-hm. I don't want--I don't want, uh, I want you just to heal, just--no, I don't. Just let it heal the good, old-fashioned way, will you let me do that? No, not yet. Well, I know, you, we all know how inconvenient doctors are, right? Yes. I want you to give me a call on--Saturday, and--since I may be off call, you just say, "He asked me to call, and told me he would be off call, and would you just s-, give him the message that I called." And I'll get back to you, 'cause I'm gonna be away next week, and I'd like to see you before I go, so I may drop over and look at your back on Sunday. Alrightie? All right, dear. Bye-bye.//

About how long is that? The walkin' up, uhm...

B: Only v-, really--I'd say, really only if it's very cold.

A: Mm-hm.

B: And I have nothing, no warm--

A: If you go up a flight of subway steps?

B: Doesn't bother me at all.

A: Mm-hm.

B: Steps don't, never bother me--I'm, I'm European, I'm not scared of steps.

A: Mm-hm.

B: So--otherwise, I have really very little complaints. Once in a while, mm, I have a little--fast heartbeat, which goes away very fast, I mean, and, I take a deep breath, and then it disappears, and sometimes, uh, I think I skip a beat once in a while--

A: When you say you have a fast heartbeat, how fast?

B: Not more than...maybe a hundred and twelve or so.

A: And--when will that happen?

B: (pause) That's a good question. Without particular...wh-when I get excited about something. I guess.

A: Mm-hm.

B: I'm very irritable. That's the only thing.

A: Gee, I ask like this because when you--

B: Yah--

A: Slip angina by me like that, you see, and--as though we're talkin' about, you know, ingrown toenails or something--when we really both know that, although it, uh, we, it's an--

B: Of course.

A: It's an important symptom, uh...

B: Sure, sure, that's why I'm--mentioning all these things--

A: Mm-hm.

B: Other symptoms, as I marked down, are--once in a while, I have to get up and pee at night. Very seldom.

A: Has a doctor ever given you medication for that constriction in your chest?

B: No.

A: Mm-hm.

B: No, it's just, I shouldn't, n-, it's the cold weather, it gets--constricted, that's all.

A: Mm-hm.

B: I have never taken medication for anything, I-I, I never take medications.

A: Is that a--religious belief you have, now?

B: No, not at all, not at all. But, uh, I don't believe in aspirin; I mean, if I feel a cold coming, I take an aspirin, but this is about as much...and I got the first time flu shots this uh, winter.

APPENDIX A - #2

TAPE QUALITY: excellent
LOG #67777 PT #3-80993

GENERAL COMMENTS: denying
FIRST VISIT? yes

I ADDRESS	II SPKR	III MAIN CONVER-SATIONAL DIVISION	IV SPEECH ACT	V LEXICAL CONTENT	VI MISC	VII ATT/ AFFECT	VIII CONCEPTUAL CATEGORIES
000001	A	opening			office		
000011	B			really no complaints			
000013	B	narrative		need checkup feel pretty			sickness, hernia
				good sometimes tired pretty			self
				busy			
000112	A		acknowlg	mm-hm			
000114	B			retired two years			retirement, self, aging
				recording, photography			hobby
			hedging	only complaint			
				don't have any really			
				except if cold			
				feel uncomfortable, chest			chest discomfort
00210	A	? interrog.		when walk?			
00206	B			yes			

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LOG #67777 PT #3-80993 (con't)

I ADDRESS	II SPKR	III MAIN CONVER-SATIONAL DIVISION	IV SPEECH ACT	V LEXICAL CONTENT	VI MISC	VII ATT/ AFFECT	VIII CONCEPTUAL CATEGORIES
00209	A			if wind blowing			
000216	B			if very cold			
000219	A			how long?			
000226	B			1-2 years			
000231	A			worse this winter?			
000243	B			no much less		forceful	
000249	A			any other time?			
000255	B			no if walk too fast uphill		minimizing	
			hedging	no reason to do really			
00319	A				start phone		
000549					end phone		
000550	A			about how long?			
000557	B			only really if cold		minimizing	

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LOG #67777 PT #3-80993 (con't)

I ADDRESS	II SPKR	III MAIN CONVER-SATIONAL DIVISION	IV SPEECH ACT	V LEXICAL CONTENT	VI MISC	VII ATT/ AFFECT	VIII CONCEPTUAL CATEGORIES
000613	A			if go up steps?			
000628	B		informing	steps don't bother me			self
000639	A		acknowldg	mm-hm			
000645	B		informing	once in a while fast heartbeat			
				goes away very fast		minimizing	
				skip a beat once in a while		casual	
000629	A			how fast?			
000743	B			not more than 112			
000752	A			when?			
000758	B			when excited I guess			
				very irritable			irritability
000813	A		challenge	when slip angina by me			angina pectoris
000857	B		acknowldg	sure			
			informing	once in a while get up at night			
000921	A			Dr. ever given you medication for			
				constriction in chest?			constriction

LOG #67777 PT #3-80993 (con't)

I ADDRESS	II SPKR	III MAIN CONVER-SATIONAL DIVISION	IV SPEECH ACT	V LEXICAL CONTENT	VI MISC	VII ATT/ AFFECT	VIII CONCEPTUAL CATEGORIES
000933	B			no			
				just cold weather constricted		minimizing	
000950	A		acknowldg	mm-hm			
000956	B		informing	never take medications			medication
001004	A			religious belief?			self
001101	B			no			
				don't believe in aspirin			
				first time flu shot			

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